CHAIRMAN OF THE JOINT CHIEFS OF STAFF MANUAL

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PERFORMING ELECTRONIC ATTACK IN THE UNITED STATES AND CANADA FOR TESTS, TRAINING, AND EXERCISES

References: See Enclosure M.

1. Purpose. This manual implements guidance for the conduct of electronic attack (EA) in tests, training, and exercises in the United States and Canada.

2. Cancellation. AFR 55-44/AR 105-86/OPNAVINST 3430.9C/MCO 3430.1B, 6 Dec 78, "Performing Electronic Countermeasures in the United States and Canada," is hereby canceled.

3. Applicability. The acronym electronic warfare (EW) more accurately includes electronic attack (EA), electronic protection (EP), and electronic warfare support (ES). This manual outlines the geographic restrictions, clearance requests and notification requirements, and operational procedures governing EA by US forces in the United States and Canada. It applies to:

a. All DOD components in the United States and Canada that are:

(1) Engaged in EA operations for tests, training, and exercises.

(2) Operating electromagnetic radiating or receiving equipment that may be subjected to interference from EA.

b. Civilian contractors performing EA for the Department of Defense. These contractors must meet the following criteria:

(1) The contractor must be under a US military contract requiring EA.

(2) The EA equipment used by the contractor has been contracted for or is owned by the US Government.

(3) A resident military representative must be available to assist the contractor in the application of this regulation and the EA clearance approval.

(4) The approved EA clearance must be on file with the DOD office administering the contract.

4. Procedures. See Enclosures C, D, E, and F.

5. Summary of Changes. The guidance and procedures in this manual were previously covered by reference 1, Enclosure M. Terms and definitions were updated while basic policy, procedures, and responsibilities have remained unchanged.

6. Releasability. This manual is approved for limited release. DOD components (to include the combatant commands) and other Federal agencies may obtain copies of this manual through controlled Internet access only (limited to .mil and .gov users) from the CJCS Directives Home Page--http://www.dtic.mil/doctrine/jel.htm. Joint Staff activities may access or obtain copies of this manual from the Joint Staff LAN.

7. Effective Date. This manual is effective upon receipt.

For the Chairman of the Joint Chiefs of Staff:

DENNIS C. BLAIR
Vice Admiral, U.S. Navy
Director, Joint Staff

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ENCLOSURE A

AUTHORITY TO CONDUCT ELECTRONIC ATTACK

1. The Communications Act of 1934. This act regulates that frequencies for radio stations "belonging to and operated by the United States are assigned by the President." This Presidential authority has been delegated to the Administrator of the National Telecommunications and Information Administration (NTIA) within the Department of Commerce. The Communications Act assigns to the Federal Communications Commission (FCC) the responsibility for regulation of nongovernment interstate and foreign telecommunications.

2. NTIA Authority. The Administrator, NTIA, discharges radio communication and frequency management functions for the Federal Government with the advice of the Interdepartment Radio Advisory Committee (IRAC). The IRAC consists of representatives from key Government departments and agencies, including each Military Service. The NTIA's National Table of Allocations defines authorized spectrum use as Primary, Permitted, and Secondary Services. These users have the right to operate in their authorized RF spectrums free from interference. EA operations are not recognized by NTIA as a primary use of the electromagnetic spectrum. However, with national approval EA may be performed under the condition of non-harmful interference.

3. In Canada. Reciprocity agreements between the United States and Canada allow US forces to carry out EA exercises upon Canadian territory. Legislative authority can be found in (Canadian) section 12.b. of the Radiocommunication Regulations made pursuant to section 4(1) of the (Canadian) Radiocommunications Act 1989, c.17, s.2.

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ENCLOSURE B

RESPONSIBILITIES

1. This manual sets forth Service responsibilities regarding radio frequency (RF) clearance coordination for the performance of EA in the United States and Canada during tests, training, and exercises.

2. US forces are employed under the authority of the combatant commanders. DOD training, tests, and exercises involving EA are vital to the effective employment of combat forces. Services must ensure that forces can operate in an intense EW environment.

3. The Communications Act of 1934 and subsequent amendments are designed to serve national security and defense as well as other national policies and goals involving spectrum-dependent equipments (Enclosure A). Additionally, the Federal Aviation Act of 1958 states that "the Secretary of Transportation shall give full consideration to the requirements of national defense." EA operations are a part of national defense and once approved under the auspices of this manual should not be terminated, except as specified below. Operators will comply with Enclosures C, D, E, and F for Termination (cease buzzer) of EA. The following are valid reasons for termination:

a. Safety-of-flight.

b. Harmful interference.

c. OPSEC.

d. Determination of the EA user.

4. The conduct of peacetime EA in areas other than defined in the Glossary, item 40, is governed by this manual as taken from references 1, 2, and 3. International Civil Aviation Organization (ICAO) and International Telecommunications Union (ITU) regulations provide further considerations for conducting EA within international airspace, but are not regulatory for DOD components. However, EA is highly regulated and confined to designated military areas as a means of accommodating ICAO safety of life concerns and ITU frequency regulations.

5. The environmental consequences of EA and its employment must be analyzed in accordance with provisions of the National Environmental Policy Act of 1969 and the accompanying Council on Environmental Quality Regulations. Consult specific service regulations.

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ENCLOSURE C

FREQUENCY CLEARANCE AND NOTIFICATION REQUIREMENTS

1. Purpose. This enclosure delineates requirements and procedures for submission of an EA clearance request message and subsequent EA frequency clearance approval notification requirements.

2. EA Clearance Request Requirements. All routine, special, or short-notice EA operations conducted in frequency bands annotated as "National" in Enclosure E require submission of an "EA Clearance Request for Nationally Controlled Frequencies" message to the respective Military Department Frequency Management Office (MILDEP FMO) for review and approval. EA clearance request messages will only be submitted to the MILDEP FMO by DOD AFC with jurisdiction over a controlled geographic area (see Enclosure J) or Fleet Area Control and Surveillance Facilities (FACSFACS) for afloat naval operations in their area of responsibility. As an exception, the DOD Eastern AFC at Patrick AFB, FL requires all EA planners or EA users to first coordinate with EAFC and then submit the EA clearance request to the MILDEP FMO. For geographic areas not under the cognizance of an agency or AFC, the Services may establish points of contact (POCs) as required. EA clearance requirements will be submitted through the appropriate geographic POC. The Service POCs will then submit requests to their respective MILDEP FMO. Individual units/organizations that do not have functional control over one of the above mentioned areas should forward EA requirements to the appropriate Service POC who will submit the EA clearance request to the MILDEP FMO. It may be necessary for the individual unit to assist the AFC or Service POC in preparation of the EA clearance request. Approval for EA in RF bands annotated "unrestricted and authorized tactical only" listed in Enclosure G is inherent in this manual. However, all EA operations, including those conducted in "unrestricted and authorized tactical only" RF bands, require coordination with the requisite AFC when conducted in the line-of-sight or within the AFC's geographic area of jurisdiction.

a. Routine EA Operations. Requests for routine EA operations in RF bands annotated "National" require coordination at the national level. EA (and expendable) clearance request messages will be submitted by the controlling agency responsible for the area in which EA is to be conducted. An EA clearance request message for each test range area, training area, restricted area, warning area or military operating area (MOA) will be submitted to the respective MILDEP FMO after coordination with the AFC or appropriate geographic POC. The exception noted in paragraph 2 above regarding DOD EAFC Patrick AFB, FL applies. The MILDEP FMO will submit requests to the appropriate FAA and FCC national and regional offices (see Enclosures H and I) as information addressees. For afloat naval operations, FACSFACS will submit blanket EA requests for the warning areas where fleet exercises and EA

operations are routine events (SOCAL, VACAPES, etc.). When the requester (controlling agency) of an EA clearance is notified by the MILDEP FMO of the approved EA activity for an area, notification should be sent from the requester by message to all users (i.e., AFC, FACSFACS, etc.) detailing what EA operations are authorized.

(1) Prior to submitting an EA clearance request or scheduling EA operations, coordination with FAA or FCC regional offices is encouraged. The MILDEP FMO will effect the final coordination with the FAA Headquarters (ASR-100) and the FCC Headquarters (Spectrum Management and other applicable national level agencies) in order to issue an EA Clearance Notification for National Frequencies. The FAA or FCC Headquarters will normally respond to such EA clearance requests within 30 calendar days of receiving the request. Approval can be granted for up to a maximum of one year for a specific frequency and/or frequency band, geographic area, altitude, time of activation, and transmission parameters, and allow the conduct of EA activity on a routine (training or annual exercises) or prescheduled (testing) basis within the defined operating limits contained in the approved clearance request.

(2) Test ranges and AFC's that have yearly EA clearance requests approved at the national level can issue clearances for any operation in their area based on the parameters issued in the EA Clearance Notification for National Frequencies message. Once a yearly request has been approved, it will be subject to review and revalidation for re-approval by national level agencies one year from the approval date. The controlling agency (or Service specified POC for each area) and their MILDEP FMO will review and revalidate requirements at least 60 days prior to expiration of the clearance. If modifications to a request are required, they will be submitted through the MILDEP FMO. The original approval request number and date should be cited in a modification. Changes to a clearance request can be submitted at any time. If no changes to previously approved requests are required, do not submit another clearance request.

b. Special EA Operations. If special EA operations are required in National RF bands (see Enclosure G) and the controlling agency does not have approved clearances for the required frequency/area, submit an EA clearance request (or modification to an existing clearance) for the duration of the special operations. EA clearance requests for special EA operations involving GPS jamming or interference must be submitted 60 calendar days prior to the mission start date, if possible, in order to allow sufficient time for national coordination. Planning Conference. An EA planning conference is recommended in order to facilitate coordination. The sponsoring controlling agency will notify appropriate agencies of the planning conference. If a planning conference is not held, the appropriate controlling agency or Service specific POC for each

area may coordinate with the regional FAA or FCC frequency managers and NORAD (see Enclosure K) to expedite the clearance process as necessary.

c. Short-Notice Events. To minimize the impact of unforseen clearance needs, the operational user will make every effort to predetermine geographic areas, frequencies, etc., and submit requirements to the AFC spectrum manager or Service POC for routine or special EA operations. When short-notice approval is needed, the Service POC or AFC will contact the Service MILDEP FMO directly and follow up via written request to the proper addressees. The FMO will determine the urgency of the request and accomplish the required coordination for approval.

3. EA Coordination with Canada. Coordination with National Defense Headquarters (NDHQ), Ottawa, Director Electronics, Communications and Spectrum Services 5 (DECSS 5) is required to conduct EA in Canada. NDHQ/DCESS 5 (Canadian MILDEP FMO) will accomplish the coordination. Frequencies eligible for EA operations in Canada are listed in Enclosure G as "National" under the Canadian heading. EA is prohibited in all other bands, unless approval has been obtained from NDHQ/DECSS 5. Approval will only be granted for the duration of each individual exercise.

a. Clearance Request Information (Canada). EA requests are to follow the procedures outlined in paragraph 4. Canadian EA clearance request will have the following information addressees:

(1) 1CAD/CANRHQ WINNIPEG MA//A3 ASR//;

(2) 1CAD/CANR//DCR/A3//, and

(3) 21 ACW SQN NORTH BAY//CO/S OPS O/SENIOR DIRECTOR.//

b. Rope Chaff. The use of rope chaff in Canada must be approved by AIRCOM WINNIPEG//AIR G3 Joint//. In addition, an environmental assessment must be approved by the NDHQ/Director Environmental Stewardship 3-2 (NDHQ/D Env S 3-2). Coordination with the above Canadian authorities will be accomplished by NDHQ/DECSS 5 (Canadian MILDEP FMO).

c. Coherent Repeaters. Noncommunications coherent repeater jamming (angle deceivers and break lock techniques) may not have a significant effect on non-victim receivers and does not require an EA frequency clearance.

4. EA Clearance Request Procedures. The following information will be provided when submitting EA clearance requests for operations in RF bands annotated as "National." Detailed information assists national coordinating agencies in assessing the impact of EA operations on the RF spectrum and expedites the approval process. However, do not delay submission of initial

request to achieve completeness. Follow-on requests can be forwarded when additional information becomes available. Ensure written requests are properly classified.

a. Submitting Clearance Requests. EA clearance requests will be submitted as previously specified (paragraph 2) as action to the Service's MILDEP FMO.

b. Message information requirements

(1) Subject. (Routine, Special, or Short-notice) EA Clearance Request for nationally-controlled frequencies.

(2) Point of Contact. Enter unit/designator, Service/MILDEP, POC, and commercial, DSN telephone numbers and e-mail address.

(3) EA Clearance Request Control Number. This number will consist of an appropriate controlling agency designation/abbreviation, the calendar year, a hyphen, and a consecutively assigned number.

Example: 1ECRG 96-4 is the fourth clearance request for CY 1996 by HQ ACC, 1st Electronic Combat Range.

(4) Period of Request. From approval date until review.

(5) EA Operating Areas, Flight Routes, Altitudes, Times and Radius of Operation.

(a) Operating Areas. Specifically define the geographic bounds in which EA operations will occur. Coordinates will be used to indicate location of ground-operated EA equipment (not radars or other simulators used to stimulate EA equipment). Airborne, shipboard, and/or ground-based EA usage will be defined from a central point (or a group of central points, identified by geographic coordinates and radius of operations of each). The name/ nomenclature of known MOA/s, restricted areas, and warning areas, flight level, or a combination of these will be included in proposed test areas.

Example: (for Warning Area) "route of flight within W-368/369 entering from SE" and the central geographic coordinates and nautical mile radius of test areas.

Example: (Geographic Bounds) 3023N 08600W, 3023N 08700W, 2958N 08600W, 2958N 08700W. Operations occur within a 25 nm radius of 302300N, 0862659W (or GPS verified coordinates, if available).

(b) Route of Flight. Provide a complete description of the operational portion of flight routes, including turn points. Include all EA start and stop geographic coordinates in the area. Specify any flexibility available in flight routes. Provide an appropriate rationale if variations in activities preclude providing specific details. Without this rationale or operational specifics, the resulting clearance may not be optimal.

Example: 25 nm N/S and 25nm E/W routes from a central point on the Eglin range located at 3023N/08626W. Some test flights extend further south over water into warning areas W155 and W151A. Routine EA start and stop points are on routes defined by longitude 08600W to 08700W at a latitude of 3023N and 2958N to 3048N at a longitude of 08626W, with turn points at the extreme of each route. Other flight routes are available, but it is important to maintain certain aircraft/ground simulator relationships to ensure adequate testing.

(c) Altitudes. Specify altitudes above ground (AGL) or mean sea level (MSL) if over water. Provide the complete range of altitudes that would be acceptable for operations and specify the most desired altitude within the acceptable range. Lower altitudes increase the probability of approval. Specify altitudes (AGL) at which chaff drops will occur if different from normal operations.

Example: 0 - 50,000 ft AGL; for most operations 20,000 ft (mostly over water) is the most desired altitude for fuel economy reasons. Lower altitudes can be accepted but will degrade the continuity of training due to reduction in flight duration. Flying at 10,000 ft will increase the cost of operations by an average of 30 percent for fuel. Flying below 9,000 places aircraft in visual flight rules (VFR) traffic corridor near the Florida coastline. All use of EA expendables are at or below 10,000 ft AGL and conducted over water in W151A.

(d) Topographical Layout. Identify specific terrain features that mask the effects of the proposed EA and reduce unintended harmful interference.

Example: Area of EA operations is bordered by 5,000-7,000 ft mountains to the north and west.

(e) Times. Provide the daily time frame in which operations may occur. Express times in Greenwich mean time (ZULU), and local time. State if operating hours are inflexible/limited and why. Identify flexibility in operating times.

Example: 0000-2400 hrs daily, however, operations are not continuous and the operating period is normally no longer than 12 hours, from 0600L-1800L (1100Z-2300Z, 1000Z-2200Z during daylight savings time) daily with variations based on need of the testers.

(f) Expected Duration per Activity. Provide expected duration, in minutes, of an average EA event.

Example: A single EA event lasts no longer than 90 minutes and may start at any time during the operating period.

(6) Positive Control. Provide information concerning standard regulations and/or special operating procedures followed, notification procedures, crew monitoring procedures, range monitoring procedures, and how chaff drops are controlled.

Example: Positive control is provided for all EA activity.

(a) Coordination is accomplished in accordance with this regulation, FAA handbooks 7610.4 and 7610.11 and range regulation MSD 55-3.

(b) Crew members monitor appropriate ATC and guard frequencies at all times and range controllers monitor communications channels and jammers for frequency drift. Cease buzzers are honored immediately.

(c) Before chaff drops are approved on a range, a single bundle of chaff is dispensed to determine if conditions are favorable and preclude unplanned drifting of chaff clouds. For afloat naval operations, policy prohibits dropping chaff if forecast impact footprint is within 30 nm of any landmass.

(7) EA Frequency Requirements and Specifications Tables. Provide a listing of required frequencies and specifications of EA jamming equipment to be used. Table C-1 is an *EA Jamming Requirements Table* which defines EA frequency requirements and jamming equipment specifications as delineated below. Ensure information provided is properly classified.

(a) Frequencies Requested. Specify the actual operating frequencies of each ground, shipborne, or airborne “simulator” or radar that EA will be conducted against. If the simulator/radar is frequency agile, give the tuning limits, or operating channels if tuning range is channelized. In general, if FAA/FCC bands are affected, they will bracket their used frequency ranges and allow DOD use of the rest of the band, if appropriate.

(b) EA Jamming Equipment Specifications. Submit nominal worst case equipment parameters, (i.e., do not list every transmitter or jammer that operates in a requested frequency range). Jammer skirts are to be set so that at 10 MHz outside the authorized bandwidth the jamming level is no more than 10 DBm above the normal grass floor level. Equipment nomenclature is not required. Provide the following information for each frequency or frequency range of operation.

1 EA Transmitter Bandwidth (BW)/Power (PWR). Provide total effective isotropic radiated power (EIRP) in DBm associated with the minimum and the maximum BWs used. If more than one transmitter type is used at the same frequency, use the worst case information.

2 Antenna Type and Directivity. Provide antenna type (horn, omnidirectional, etc.) associated with transmitters in each band of operation. Antenna Gain in dB, specify the horizontal beam width (BMW)(half-power point) for directional antennas and sidelobe information to enable evaluation of how flight routes may preclude interference to non-victim radars.

3 Remarks Section. Identify types of jamming used (i.e., noise spot, deception jamming, etc.) and any other pertinent information, such as simulator frequency change limitations, antenna information, etc.

(c) Table C-1. *Example:* EA frequency requirement and specification table.

Table C-1. EA Jamming Requirements Table

Frequency/Tuning Range[1]	Min BW/PWR	Max BW/PWR	Ant/BMW[2]
2,400/None	50/20 Watts	200/5 Watts	Horn/120
2,450/2,400-2,600	[3]	[3]	[3]
3,200/3,200-3,400[4]	[3]	[3]	[3]
3,320/3,200-3,400[4]	[3]	[3]	[3]
3,700/3,600-3,800	[3]	[3]	[3]
5,250/5,200-5,400[5]	[3]	[3]	[3]
5,350/5,200-5,400[5]	[3]	[3]	[3]
6,500/6,200-6,800	[3]	[3]	[3]
6,900/None	[3]	[3]	[3]
7,100/6,700-7,400[6]	[3]	[3]	[3]
7,125/6,700-7,400[6]	[3]	[3]	[3]
7,150/6,700-7,400[6]	[3]	[3]	[3]
7,850/7,800-8,500	[3]	[3]	[3]
8,900/7,800-8,400[3]	50/200 Watts	200/50 Watts	Horn/120
9,150/9,100-9,600	[3]	[3]	[3]
9,160/Fixed	[3]	[3]	[3]
9,200/8,500-9,600	[3]	[3]	[3]
12,700/12,700-13,300	[3]	[3]	[3]
14,500/14,000-15,000[6]	[3]	[3]	[3]
14,750/14,300-15,200	[3]	[3]	[3]

Remarks/Notes:

[1]EA in these bands is either noise or deception jamming.

[2]Effective antenna coverage is 120° of the nose and tail of aircraft. Sidelobes 60°-120° and 240°-300° are up to 30db down.

[3]Same BW/PWR/BMW as listed in "2400/none" line.

[4]Must have 60 MHz separation between these frequencies.

[5]Must have 100 MHz separation between these frequencies.

[6]Fixed channels in tuning range with 100 MHz separation.

5. Clearance Requests for Chaff Operations

a. Environmental Policy. Chaff will not be dropped due to the potential environmental hazards, unless specific authorization is granted from the Service Environmental Division. Training routes, ranges, and civilian airspaces in CONUS should be assessed and approved before chaff may be released. When environmental assessments have been accomplished, frequency clearances can be sought to dispense chaff. Once these requirements are met, chaff may be dispensed when:

(1) There are no EPA restrictions in CONUS restricted air Spaces (for example: air-to-ground gunnery ranges or warning areas).

(2) Flying activities, complying with FAA regulations, are dispersed over a wide area and do not frequently (greater than once a day) pass over the same ground points.

b. Interference. To eliminate harmful interference in dense air traffic areas and reduce the number of terminations, every effort should be made to conduct chaff drops away from major air routes and air route hubs. Winds aloft will be plotted to ensure that the chaff does not drift into major air routes and air route hubs. Even when chaff dispensing is stopped at the request of the air traffic control radar facility, the interference due to chaff may remain for some time.

c. Designated Chaff Drop Areas. Chaff drop areas (primarily within controlled airspaces - MOAs, restricted areas, and warning areas) are established (using normal clearance request procedures per paragraph 5; see paragraph 1 for who submits clearance requests) throughout the CONUS. These areas, in general, were designed to provide safe operating distances from commercial air routes and airports. Once a clearance request is approved, any Service organization may use these areas as long as the activity is scheduled with the controlling agency (airspace owner), coordinated with the DOD AFC (if within their AOR); conducted within the limits of the national clearance approval; and the following criteria are observed:

(1) Chaff drops must be thoroughly mission planned. For each mission, consider the following factors during the planning phase:

(a) The geographic features of the area where the chaff is to be dispensed.

(b) The wind conditions aloft.

(c) Planned drop altitude and predicted rate of fall of chaff.

(d) Allowances for error.

(2) INDIA and JULIET band chaffs may be dropped within these areas with minimal restriction, once an original clearance request has been approved. Interference to FAA systems by this chaff is minimal. However, ARTCC (local FAA) will be notified 10 minutes prior to the drop.

d. Restrictions on Rope Chaff. Rope chaff requires national-level approval, in addition to environmental approval. (See subparagraph 3b for Canadian operations.) Rope chaff can damage high voltage transmission lines and create hazards to life and property. Every precaution must be taken to ensure that the rope chaff falls on water or on land devoid of high-voltage electric power transmission lines.

e. Chaff Frequency Requirements and Specifications

(1) Frequency Bands Affected. Include the chaff's cut frequency or specified frequency response in MHz. INDIA and JULIET frequency bands have the least potential for impact on air traffic control radars. State whether INDIA/JULIET band chaff is acceptable for all training/testing.

(2) State under what circumstances other frequency band types of chaff (for example, RR-180) must be dropped. If it is necessary to drop chaff that affects the DELTA/ECHO frequency bands, describe safety precautions you intend to use to ensure that chaff will not drift into air traffic corridors or airport areas.

(3) Provide dispense, estimated fall and dispersal rates if known, and the amount of chaff normally dispensed.

(4) Identify percentage of stream vice burst chaff drop (e.g., 90-percent burst and 10-percent stream) in normal operations.

(5) Remarks or Notes. Place all information in subparagraphs 6e(2) through 6e(4) above in the remarks section. Add any additional information that is pertinent to your chaff drop.

f. Table C-2, EA Chaff Drop Requirements Request. The following table describes the types of chaff to be used for testing, if approved (frequencies in MHz unless stated otherwise).

Table C-2. EA Chaff Drop Requirements Request

Type	Frequency Range[1]	Resonant Frequencies	Fall Rate
RR-1111	8,000 – 22,000	5, 9, 12, 18, 21 GHz	98ft/min(note 2)
RR-0000[3]	1,500 – 17,000[4]	2, 4, 8, 16 GHz	Same

REMARKS/NOTES:
Chaff drop activity is normally about 60 minutes or less in duration. Dispersal rate varies with wind conditions. The amount of chaff dropped varies between 50 and 500 bundles. The percentage stream and burst is about 20 percent vs 80 percent, respectively.

1 Effective Frequency Range. Frequency response range is greater, but radar return is significantly reduced at lower or higher frequencies.

2 Slowest estimated fall rate.

3 RR-180 chaff is required periodically for testing of equipment that operates in the lower portion of its frequency range. Testing cannot be accomplished with RR-172.

4 See subparagraph 5e(2) for precautions in use for chaff drops in this frequency range.

g. Security Classification Instructions. Classify in accordance with DODD 5200.1R and any applicable classification guides. Enter statement indicating what item entries singularly or collectively (note compilation rule in the directive) make the request classified.

ENCLOSURE D

OPSEC CONSIDERATIONS

OPSEC advisories are transmitted as messages from Service agencies (for example: USAF, HQ AIA, AFIWC). These advisories must be consulted and Services must ensure a collection threat does not exist during times of EA or simulator transmissions of a classified nature.

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ENCLOSURE E

EA FREQUENCY CLEARANCE NOTIFICATION

1. Office Responsible for EA Clearance Notification. EA frequency clearance approval notification will be issued by the MILDEP FMO for national clearance requests when approval is granted for operations NLT 10 working days prior to proposed start date.

2. Contents of EA Approval Clearance Notification. Approval notification will contain the following information:

a. Action Addressees. Service frequency coordinator and controlling agency that made request.

b. Subject. EA Clearance Notification for National Frequencies.

c. Reference. EA clearance request control number.

d. Initiation and Expiration Dates

e. Area of Operation. Name of range, military operating area, restricted area, warning area and coordinates, and approved altitudes for airborne operations.

f. Hours. Weekly or daily operating hours, EA start/stop times (in ZULU), and duration of EA in hours.

g. Frequencies Approved

(1) Buzzer. Bands, channels, or specific frequencies approved for jamming with BWs will be listed. Frequencies denied may be listed as well.

(2) Chaff. For burst or stream, frequency bands affected will be indicated. "NONE" will be indicated, if denied.

h. Remarks. Information on restrictions, distribution, and special procedures will be placed here. Include statement "cease buzzer procedures will be in effect." List EA mission point of contact, telephone (DSN and commercial), and organization. If clearance approval notification does not provide specific dates and times, include the statement: "Note: EA notification message will be sent by operating unit to addressees as above, NLT 10 working days prior to EA operations. Reference this clearance approval notification, and state date and time EA will be conducted."

3. In-Flight EA Notification

a. ARTCC, NORAD, and Range Controller Notification. Clearance requests, which have been approved at the national level, allow EW users to conduct air, land, or sea-based operations within the CONUS. Direct in-flight notification of EA activity to ARTCC, NORAD, and/or the range controller, which have jurisdiction over the areas where operations have been approved, is mandatory. No additional in-flight clearance requests for EA outside the planned training scenario should be attempted. Only EA activity that has been previously approved may be conducted. The previously approved EA activity will be indicated on the flight plan (DD Form 175). The Cheyenne Mountain Operations Center (CMOC), Command Director (CD), as CINCNORAD/ CINCSPACE representative, is authorized to direct the termination of any EA activity that adversely affects the ability to carry out the mission of the surveillance of air and space against an attack on North America. Additionally, agencies (air space managers and DOD AFC offices) having jurisdiction over airspace involved in EW activity can deny EW activity for safety-of-flight considerations or scheduling conflicts.

(1) Notification Information. Notify FAA, NORAD, and/or range controllers (as appropriate) of the following flight information to confirm EW activity:

(a) Aircraft call sign and flight-level.

(b) FAA approval number (EW Request number, e.g., 1ECRG90-4).

(c) Type of EW (i.e., electronic jamming (“buzzer”) or EA expendables, e.g. burst or stream chaff, active decoys, unattended jammers.

(d) Frequency bands and channels affected (see Enclosure E for band designations).

(e) Location and duration of EW activity. NOTE: Chaff fall rate and wind factors are used to determine area of burst or stream activity. For example, "Kansas City Center, this is Dragon 44, EA #AFW 90-1 on file, buzzer bands BRAVO thru JULIET, stream chaff at IP."

(2) Frequency Band Designators. All references to RF bands for EA clearance purposes will use numeric designations in MHz. For example, “Center, buzzer three one two five megahertz thru three three zero zero megahertz.” The entire list and a cross-reference graph to former designators is in Enclosure G.

(3) Notification of the EA activity must be relayed to the NORAD region/sector having jurisdiction over the involved air space. In the open area

as defined in FAA Handbook 7610.4G, EA activity will be coordinated with the applicable ARTCC. In CONUS when NORAD is not within radio range, aircrews must contact the ARTCC and request they notify NORAD of EA activity. In-flight EA notification should be accomplished at least 10 minutes before desired EA start time.

(4) In Canada, aircrews are to contact the Senior Director, North Bay at telephone numbers CSN(DSN) 628-6401(6402/6404 or 6405) or commercial 705-494-6011 then local 6401 (6402/6404/or 6405).

(5) Previously approved burst chaff drops will only be accomplished when final approval, immediately preceding the drop, is received from the ARTCC, NORAD, and/or range controller having jurisdiction of the airspace.

(6) If approved EA activity is denied, the reason for denial will be given and treated as a "cease buzzer." Document appropriate information for reference.

b. NORAD Notification Procedures. NORAD will use the following notification procedures (depending on area of EA operation) as appropriate for pre-approved EW clearance requests.

(1) If activity will affect national frequencies within bands D-3, D-4, E-8, E-9, G-6, I-3, I-4, I-5, I-6, I-7, I-8, K-2, or K-3 (see Enclosure G); or if activity will affect FAA or NORAD joint-surveillance radars.

(2) NORAD will notify the applicable AFC, if known, when EW operations may impact operations in an EW geographic area of cognizance (see Enclosure J).

4. Clearance Notification. After validating the EA clearance notification received from the MILDEP FMO, the Service frequency coordinator will provide approval notification to the controlling agency that made the request. Send the EA clearance notification to the following information addressees:

a. Operating units as appropriate.

b. CMOC CHEYENNE MOUNTAIN AS CO//J3/J3O/ADOC/MWC/SCC//.

c. DOD AFC (see Enclosure J).

d. HQ FAA Washington DC/ASR-1, if applicable.

e. FCC Washington DC/Frequency Liaison Branch, if applicable.

f. National Weather Service, if applicable.

g. Appropriate FCC Field Operations Office, if applicable.

h. Appropriate FAA ARTCC, if applicable.

i. FAA Regional FMO (see Enclosure I), if applicable.

j. For Canadian clearances, refer to Enclosure C, subparagraph 3a.

k. Appropriate NORAD regions/sectors that may be affected.

l. HQ USAF/XOIWO.

m. CINCUSACOM NORFOLK VA//J3/J6/J7// (for training/exercises in ACOM AOR).

n. COGARD NAVCEN ALEXANDRIA VA//NIS// (for maritime operations).

o. JSC ANNAPOLIS MD//OP/IS//

ENCLOSURE F

CEASE BUZZER PROCEDURES

Cease Buzzer Procedures. When suspension of EW activity is required for safety-of-flight reasons, in cases of harmful interference to authorized users of the RF spectrum or for OPSEC reasons, the following procedures will be used:

1. Communications Monitoring. During airborne EW, all EW aircraft must monitor the emergency guard frequency (either 121.5 or 243.0 MHz) continuously in addition to the frequency used for cease buzzer requests.

2. Safety-of-Flight. Authorized users of the spectrum requesting "cease buzzer" for safety-of-flight reasons will broadcast the request directly to the EW originator on the frequency in use or on emergency guard channel or will request cease buzzer through the controlling agency or AFC via ground to air radio. Everyone else contacts Range Control or the AFC by phone for a cease buzzer order. Exceptions are made by the AFC for major exercise command posts. The request will include identification, type of facility, RF bands involved, and duration of suspension. The EW originator will immediately cease the EW activity and notify the requester of cessation.

3. Other Than Safety-of-Flight. Authorized users of the spectrum requesting "cease buzzer" for other than safety-of-flight reasons will contact the appropriate controlling agency and provide identification, type of facility, RF bands involved, and duration of suspension. For example, "Boston Sector, this is Boston Center request cease buzzer 2,200 megahertz thru 2,300 megahertz for 5 minutes." The controlling agency will immediately pass the "cease buzzer" request to the EW source relaying the appropriate information. For example, "Bounder 31 this is Boston Sector. Cease buzzer 2,200 megahertz thru 2,300 megahertz for 5 minutes."

4. Reinstatement of EW. Facilities requesting suspension of EW will notify the controlling agency or EW originator when EW activity may be resumed.

5. Documentation. EW operators and controlling agencies as appropriate will log all pertinent information regarding the "cease buzzer" request and compliance, i.e., time, RF bands, requester, time of reinstatement, and method by which request was received. Logs will be retained in accordance with Service directives governing control logs.

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ENCLOSURE G

EW FREQUENCY BAND DESIGNATIONS

1. Operational Band and Channel Codes. The following bands and channels are set up to give one standard system of frequency band designations for EW operations and to facilitate the operational control of EW. The bands are identified in alphabetical sequence. Each band is divided into 10 numerical channels. The phonetic alphabet and numerical channel numbers are used to identify the EW frequency. During operations, when it becomes necessary to identify an exact frequency, the frequency is specified as a numerical designation (lowest frequency in any channel) plus frequency in MHz above the base frequency. Example for 1315 MHz: DELTA 4 covers the channel 1,300-1,400, therefore, 1,315 MHz would be designated DELTA 4 plus 15.

Table G-1. Frequency Band Designations

Band	Frequency (MHz)	Channel Width (MHz)
A(lpha)	0 – 250	25
B(ravo)	250 – 500	25
C(harlie)	500 - 1,000	50
D(elta)	1,000 - 2,000	100
E(cho)	2,000 - 3,000	100
F(oxtrot)	3,000 - 4,000	100
G(olf)	4,000 - 6,000	200
H(otel)	6,000 - 8,000	200
I(ndia)	8,000 - 10,000	200
J(uliet)	10,000 - 20,000	1,000
K(ilo)	20,000 - 40,000	2,000
L(ima)	40,000 - 60,000	2,000
M(ike)	60,000 - 100,000	4,000
N(ovember)	100,000 - 200,000	10,000
O(scar)	200,000 - 300,000	10,000

The Figure G-1 depicts the correlation between previous frequency band designations (sometimes used by ARTCC) and band designators defined in this enclosure.

Frequency Range	EW Frequency Band	* Radar Design Frequency Band
0-250 MHz	A	HF/VHF
250-500 MHz	B	UHF
500-1,000 MHz	C	UHF
1-2 GHz	D	L
2-3 GHz	E	S
3-4 GHz	F	S
4-6 GHz	G	C
6-8 GHz	H	C
8-10 GHz	I	X (8-12.5 GHz)
10-20 GHz	J	Ku (12.5-18 GHz)
20-40 GHz	K	K (18-26.5 GHz)
40-60 GHz	L	Ka (26.5-40 GHz)
60-100 GHz	M	40-100 Millimeter

* Band designations sometimes used by ARTCC

Figure G-1. Frequency Band Designations

2. Frequency Band Status

a. Canada. In the frequency list under Canada, frequency bands designated as candidates for EW applications are shown as "National." EW is prohibited in all other bands unless authorized through national coordination by NDHQ/DECSS 5 (Canadian MILDEP FMO).

b. United States. The following list of frequencies has been coordinated at the national level. The status of the frequency bands for EW in the United States is annotated below as Unrestricted, Local, National, or Authorized Tactical (Auth Tac) use only. Each status is defined in the glossary of this manual. EW activity in the United States requires clearance in a specified geographic area.

c. National Coordination. The frequency bands are listed consecutively to include all frequencies for ease of presentation. Obviously, one frequency cannot require national coordination and also be authorized for tactical. Therefore, the following rules apply. All frequency bands requiring local or national coordination are inclusive. All unrestricted or authorized tactical bands begin or end at the first increment adjacent to the restricted frequencies. For example; in the three adjacent bands 226-229, 229-230, and 230-239 MHz, all frequencies from 229.0 through 230.0 require national coordination. Frequencies 226.001 through 228.999 and 230.001 through 238.999 are authorized tactical.

Table G-2. Level of Frequency Coordination Required by Band, Channel, Frequency Band, and Range

Channel	(MHz)	United States	Canada
A-1	0-25	National[1]	
A-2	25-50	National[1]	National
A-3	50-75.2		
	[50-54	Unrestricted	
	54-73	Local (FCC)	
	73-75.2]	National[1]	National
A-4	75.2-100		
	[75.2-75.4	National[1]	
	75.4-100]	Local (FCC)	
A-5	100-125		
	[100-108	Local (FCC)	
	108-125]	National[1]	
A-6	125-150		
	[125-138	National[1]	National
	138-150]	Auth Tac	
A-7	150-175		
	[150-162	Auth Tac	National
	162-174	National[1]	National
	174-175]	Local (FCC)	
A-8	175-200	Local (FCC)	
A-9	200-225		
	[200-216	Local (FCC)	
	216-220	National[1]	
	220-225]	Unrestricted	
A-10	225-250		
	[225-226	National[1]	
	226-229	Auth Tac	National
	229-230	National[1]	
	230-239	Auth Tac	National
	239-240	National[1]	
	240-242.5	Auth Tac	
	242.5-243.5	National (Guard)	
	243.5-248	Auth Tac	National
	248-249	National[1]	

[1] FAA Coordination Required

Channel	(MHz)	United States	Canada
	249-250]	Auth Tac	National
B-1	250-275		
	[250-251	Auth Tac	National
	251-252	National[1]	
	252-253	Auth Tac	National
	253-258	National[1]	
	258-259	Auth Tac	National
	259-260	National[1]	
	260-263	Auth Tac	National
	263-264	National[1]	
	264-266	Auth Tac	National
	266-267	National[1]	
	267-269	Auth Tac	National
	269-271	National[1]	
	271-272	Auth Tac	National
	272-274	National[1]	
	274-275]	Auth Tac	National
B-2	275-300		
	[275-276	National[1]	
	276-277	Auth Tac	National
	277-280	National[1]	
	280-281	Auth Tac	National
	281-283	National[1]	
	283-284	Auth Tac	National
	284-286	National[1]	
	286-287	Auth Tac	National
	287-292	National[1]	
	292-294	Auth Tac	National
	294-295	National[1]	
	295-296	Auth Tac	National
	296-297	National[1]	
	297-298	Auth Tac	National
	298-300]	National[1]	
B-3	300-325		
	[300-306	Auth Tac	National
	306-308	National[1]	
	308-316	Auth Tac	National
	316-324	National[1]	
	324-325]	Auth Tac	National
B-4	325-350		
	[325-326	Auth Tac	National
	326-342	National[1]	
	342-343	Auth Tac	National
	343-344	National[1]	
	344-345	Auth Tac	National

Channel	(MHz)	United States	Canada
	345-347	National[1]	
	347-348	Auth Tac	National
	348-350]	National[1]	
B-5	350-375		
	[350-356	National[1]	National
	356-357	Auth Tac	National
	357-358	National[1]	
	358-360	Auth Tac	National
	360-361	National[1]	
	361-362	Auth Tac	National
	362-364	National[1]	
	364-369	Auth Tac	National
	369-372	National[1]	
	372-375]	Auth Tac	National
B-6	375-400		
	[375-377	Auth Tac	National
	377-378	National[1]	
	378-379	Auth Tac	National
	379-382	National[1]	
	382-385	Auth Tac	National
	385-386	National[1]	
	386-387	Auth Tac	National
	387-389	National[1]	
	389-390	Auth Tac	National
	390-394	National[1]	
	394-396	Auth Tac	National
	396-398	National[1]	
	398-400]	Auth Tac	National
B-7	400-425		
	[400-420	National[1]	National
	420-425]	Unrestricted	National
B-8	425-450	Unrestricted	National
B-9	450-475	National[1]	National
B-10	475-500	National[1]	
C-1	500-550		
	[500-512	National[1]	
	512-550]	Local (FCC)	
C-2	550-600	Local (FCC)	

Channel	(MHz)	United States	Canada
C-3	600-650		
	[600-608	Local (FCC)	
	608-614	National[1]	
	614-650]	Local (FCC)	
C-4	650-700	Local (FCC)	
C-5	700-750	Local (FCC)	
C-6	750-800	Local (FCC)	
C-7	800-850		
	[800-806	Local (FCC)	
	806-850]	National[1]	
C-8	850-900	National[1]	National
C-9	900-950		
	[900-902	National[1]	National
	902-928	Unrestricted	National
	928-950]	National[1]	National
C-10	950-1,000	National[1]	National
D-1	1,000-1,100	National[1]	National
D-2	1,100-1,200	National[1]	National
D-3	1,200-1,300	National[1]	National
D-4	1,300-1,400	National[1]	National
D-5	1,400-1,500	National[1]	National
D-6	1,500-1,600	National[1]	
D-7	1,600-1,700	National[1]	
D-8	1,700-1,800	National[1]	
D-9	1,800-1,900	National[1]	National
D-10	1,900-2,000	National[1]	
E-1	2,000-2,100	National[1]	
E-2	2,100-2,200	National[1]	

Channel	(MHz)	United States	Canada
E-3	2,200-2,300	National[1]	
E-4	2,300-2,400		
	[2,300-2,310	Unrestricted	
	2,310-2,390	National[1]	National
	2,390-2,400]	Unrestricted	National
E-5	2,400-2,500		
	[2,400-2,450	Unrestricted	National
	2,450-2,500]	National[1]	National
E-6	2,500-2,600	National[1]	National
E-7	2,600-2,700	National[1]	National
E-8	2,700-2,800	National[1]	National
E-9	2,800-2,900	National[1]	National
E-10	2,900-3,000	National[1]	National
F-1	3,000-3,100	Unrestricted	National
F-2	3,100-3,200	Unrestricted	National
F-3	3,200-3,300	Unrestricted	National
F-4	3,300-3,400	Unrestricted	National
F-5	3,400-3,500	Unrestricted	National
F-6	3,500-3,600	Unrestricted	National
F-7	3,600-3,700		
	[3,600-3,650	Unrestricted	National
	3,650-3,700]	National[1]	National
F-8	3,700-3,800	National[1]	National
F-9	3,800-3,900	National[1]	National
F-10	3,900-4,000	National[1]	National
G-1	4,000-4,200	National[1]	National
G-2	4,200-4,400	National[1]	National
G-3	4,400-4,600	Unrestricted	National

Channel	(MHz)	United States	Canada
G-4	4,600-4,800		
	[4,600-4,635	Unrestricted	National
	4,635-4,685	National[1]	National
	4,685-4,800]	Unrestricted	National
G-5	4,800-5,000		
	[4,800-4,990	Unrestricted	National
	4,990-5,000]	National[1]	National
G-6	5,000-5,200	National[1]	National
G-7	5,200-5,400		
	[5,200-5,250	National[1]	National
	5,250-5,400]	Unrestricted	National
G-8	5,400-5,600	Unrestricted	National
G-9	5,600-5,800		
	[5,600-5,650	National[1]	National
	5,650-5,800]	Unrestricted	National
G-10	5,800-6,000		
	[5,800-5,925	Unrestricted	National
	5,925-6,000]	National[1]	National
H-1	6,000-6,200	National[1]	
H-2	6,200-6,400	National[1]	National
H-3	6,400-6,600	National[1]	National
H-4	6,600-6,800	National[1]	National
H-5	6,800-7,000	National[1]	
H-6	7,000-7,200	National[1]	
H-7	7,200-7,400	National[1]	
H-8	7,400-7,600	National[1]	
H-9	7,600-7,800	National[1]	
H-10	7,800-8,000	National[1]	
I-1	8,000-8,200	National[1]	National
I-2	8,200-8,400	National[1]	National

Channel	(MHz)	United States	Canada
I-3	8,400-8,600		
	[8,400-8,500	National[1]	National
	8,500-8,600]	Unrestricted	National
I-4	8,600-8,800	Unrestricted	National
I-5	8,800-9,000	Unrestricted	National
I-6	9,000-9,200	National[1]	National
I-7	9,200-9,400	Unrestricted	National
I-8	9,400-9,600	Unrestricted	National
I-9	9,600-9,800	Unrestricted	National
I-10	9,800-10,000	Unrestricted	
J-1	10,000-11,000		
	[10,000-10,550	Unrestricted	National
	10,550-11,000]	National[1]	National
J-2	11,000-12,000		
	[11,000-11,700	National[1]	National
	11,700-12,000]	Local (FCC)	National
J-3	12,000-13,000	Local (FCC)	National
J-4	13,000-14,000		
	[13,000-13,250	Local (FCC)	National
	13,250-14,000]	Unrestricted	National
J-5	14,000-15,000	National[1]	National
J-6	15,000-16,000	National[1]	National
J-7	16,000-17,000	National[1]	National
J-8	17,000-18,000		
	[17,000-17,700	National[1]	National
	17,700-18,000]	Local (FCC)	National
J-9	18,000-19,000	Local (FCC)	National
J-10	19,000-20,000		
	[19,000-19,300	Local (FCC)	National
	19,300-19,400	National[1]	National
	19,400-19,700	Local (FCC)	National

Channel	(MHz)	United States	Canada
	19,700-20,000]	Unrestricted	National
K-1	20,000-22,000		
	[20,000-21,200	Unrestricted	
	21,200-22,000]	National[1]	
K-2	22,000-24,000	National[1]	
K-3	24,000-26,000		
	[24,000-24,470	National[1]	
	24,470-26,000]	Unrestricted	
K-4	26,000-28,000		
	[26,000-27,525	Local (FCC)	
	27,525-28,000]	Local (FCC)	
K-5	28,000-30,000	Local (FCC/USCG)	
K-6	30,000-32,000		
	[30,000-31,300	Local (FCC)	
	31,300-31,800	National[1]	National
	31,800-32,000]	Unrestricted	National
K-7	32,000-34,000	Unrestricted	National
K-8	34,000-36,000	Unrestricted	National
K-9	36,000-38,000	Unrestricted	National
K-10	38,000-40,000		
	[38,000-38,600	Unrestricted	National
	38,600-40,000]	Local (FCC)	National
L-1	40,000-42,000	Unrestricted	
L-2	42,000-44,000	Unrestricted	
L-3	44,000-46,000	Unrestricted	
L-4	46,000-48,000	Unrestricted	
L-5	48,000-50,000	Unrestricted	

Channel	(MHz)	United States	Canada
L-6	50,000-52,000		
	[50,000-51,400	Unrestricted	
	51,400-52,000]	National[1]	
L-7	52,000-54,000	Unrestricted	
L-8	54,000-56,000		
	[54,000-54,250	National[1]	
	54,250-56,000]	Unrestricted	
L-9	56,000-58,000)	Unrestricted	
L-10	58,000-60,000		
	[58,000-58,200	Unrestricted	
	58,200-59,000	National[1]	
	59,000-60,000]	Unrestricted	National
M-1	60,000-64,000	Unrestricted	National
M-2	64,000-68,000		
	[64,000-65,000	National[1]	
	65,000-68,000]	Unrestricted	
M-3	68,000-72,000	Unrestricted	
M-4	72,000-76,000	Unrestricted	
M-5	76,000-80,000	Unrestricted	
M-6	80,000-84,000	Unrestricted	
M-7	84,000-88,000		
	[84,000-86,000	Unrestricted	
	86,000-88,000]	National[1]	
M-8	88,000-92,000	National[1]	
M-9	92,000-96,000	Unrestricted	National
M-10	96,000-100,000	Unrestricted	
N-1	100,000-110,000		
	[100,000-100,200	Unrestricted	
	100,200-102,000	National	
	102,000-105,000	Unrestricted	
	105,000-110,000]	National[1]	

Channel	(MHz)	United States	Canada
N-2	110,000-120,000		
	[110,000-116,000	National[1]	
	116,000-120,000]	Unrestricted	
N-3	120,000-130,000	Unrestricted	
N-4	130,000-140,000	Unrestricted	
N-5	140,000-150,000	Unrestricted	
N-6	150,000-160,000	Unrestricted	
N-7	160,000-170,000		
	[160,000-164,000	Unrestricted	
	164,000-168,000	National[1]	
	168,000-170,000]	Unrestricted	
N-8	170,000-180,000	Unrestricted	
N-9	180,000-190,000		
	[180,000-182,000	Unrestricted	
	182,000-185,000	National[1]	
	185,000-190,000]	Unrestricted	
N-10	190,000-200,000	Unrestricted	
O-1	200,000-210,000	Unrestricted	
O-2	210,000-220,000		
	[210,000-217,000	Unrestricted	
	217,000-220,000]	National[1]	
O-3	220,000-230,000	Unrestricted	
O-4	230,000-240,000		
	[230,000-231,000	National[1]	
	231,000-240,000]	Unrestricted	
O-5	240,000-250,000	Unrestricted	
O-6	250,000-260,000		
	[250,000-252,000	National[1]	
	252,000-260,000]	Unrestricted	
O-7	260,000-270,000	Unrestricted	
O-8	270,000-280,000	Unrestricted	

Channel	(MHz)	United States	Canada
O-9	280,000-290,000	Unrestricted	
O-10	290,000-300,000	Unrestricted	

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ENCLOSURE H

FCC FIELD OFFICES

District	Office Information	State/Territory
1	Federal Communications Commission Atlanta Field Office Koger Center Gwinnet, Suite 320 3575 Koger Boulevard Duluth, GA 30136-4958 Phone: 404-279-4621	Alabama, Florida (Escambia and Santa Rosa counties), Georgia, South Carolina, Tennessee.
2	Federal Communications Commission Boston Field Office 1 Batterymarch Park Quincy, MA 02169-7495 Phone: 617-770-4023	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont.
3	Federal Communications Commission Chicago Field Office Park Ridge Office Center, Room 306 1550 Northwest Highway Park Ridge, IL 60068-1460 Phone: 847-298-5401	Illinois; Indiana (All counties except those Schoolcraft counties); Wisconsin listed for Detroit Field Office); Kentucky (All counties except those listed for Detroit Field.
4	Federal Communications Commission Dallas Field Office 9330 LBJ Freeway, Room 1170 Dallas, TX 75243-3429 Phone: 214-235-3369	Oklahoma; Texas.
5	Federal Communications Commission Denver Field Office 165 South Union Boulevard, Suite 860 Lakewood, CO 80228-2213 Phone: 303-969-6497	Colorado, New Mexico, South Dakota, Wyoming.
6	Federal Communications Commission Detroit Field Office 24897 Hathaway Street Farmington Hills, MI 48335-1552 Phone: 810-471-5924	Indiana (Allen, De Kalb, Elkhart, Fulton, Kosciusko, La Grange, Marshall, Noble, St Joseph, Steuben, Whitley counties), Kentucky(Bath, Bell, Boone, Bourbon, Boyd, Bracken, Breathitt, Campbell, Carter, Clark, Clay, Elliott, Estill, Fayette, Fleming, Floyd, Franklin, Gallatin, Garrard, Grant, Greenup, Harlan, Harrison, Jackson, Jessamine, Johnson, Kenton, Knox, Knott, Larel, Lee, Lawrence, Leslie, Letcher, Lewis, Lincoln, Madison, Magoffin, Martin, Mason, McCreary, Menifee, Montgomery, Morgan, Nicholas, Owen, Ownsley, Pendleton, Perry, Pike, Powell, Pulaski, Robertson, Rockcastle, Rowan, Wayne, Whitley, Wolfe, Woodford and Scott counties); Michigan (All counties except those listed for Chicago Field Office); Ohio.

7	Federal Communications Commission Kansas City Field Office 8800 East 63rd Street, Room 320 Kansas City, MO 64133-4895 Phone: 816-353-3773	Iowa; Kansas; Missouri; Nebraska; North Carolina.
8	Federal Communications Commission Columbia Operations Center P. O. Box 250 Columbia, MD 21045-9998 Phone: 301-725-3474	District of Columbia; Maryland; West Virginia.
9	Federal Communications Commission Los Angeles Field Office Cerritos Corporate Tower 18000 Studebaker Road, Room 660 Cerritos, CA 90701-3684 Phone: 310-809-2096	California (Kern, Los Angeles, Orange, San Bernardino, San Luis Obispo, Santa Barbara, Escambia, Santa Rosa, and Ventura counties).
10	Federal Communications Commission New Orleans Field Office 800 West Commerce Road, Room 505 New Orleans, LA 70123-3333 Phone: 504-589-2905	Arkansas; Louisiana; Mississippi.
11	Federal Communications Commission New York Field Office 201 Varick Street New York, NY 10014-4870 Phone: 212-620-3437	New Jersey (Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Passaic, Sumerset, Sussex, Union and Warren counties); New York.
12	Federal Communications Commission Philadelphia Field Office One Oxford Valley Office Bldg., Room 404 2300 East Lincoln Highway Langhorne, PA 19047-1859 Phone: 215-752-1324	Delaware; New Jersey (Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Ocean and Salem counties); Pennsylvania.
13	Federal Communications Commission San Diego Field Office Interstate Office Park 4542 Ruffner Street, Room 370 San Diego, CA 92111-2216 Phone: 619-467-0549	Arizona; California (Imperial, Riverside and San Diego counties); Utah (Emery, Garfield, Grand, Kane, Piute, San Juan, Sevier and Wayne counties).
14	Federal Communications Commission San Francisco Field Office 3777 Deport Road, Room 420 Hayward, CA 94545-2756 Phone: 510-732-9046	California (Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Inyo, Kings, Lake, Lassen, Madera, Marin, Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Napa, Nevada, Placer, Plumas, Sacramento, San Benito, San Francisco, San Joaquin, San Mateo, Santa Cruz, Shasta, Sierra, Siskiyou, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Yolo and Yuba counties); Guam; Hawaii; Nevada, Utah (All counties except those listed for San Diego Field Office).

15	Federal Communications Commission Seattle Field Office 11410 NE 122nd Way, Suite 312 Kirkland, WA 98034-6927 Phone: 206-821-9037	Alaska; Idaho; Montana; Oregon; Washington.
16	Federal Communications Commission Tampa Field Office 2203- N. Lois Avenue, Room 1215 Tampa, FL 33607-2356 Phone: 813-348-1508	Florida (All counties not covered by Atlanta Field Office); Puerto Rico; Virgin Islands.

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ENCLOSURE I

FAA REGIONAL OFFICES AND AREAS OF RESPONSIBILITY

Region	Address	Area of Responsibility
Headquarters	Federal Aviation Administration Spectrum Policy and Management, ASR-1 800 Independence Avenue, SW Washington, D.C. 20591 Phone: 202-267-7365	
MSG ADD: FAA HEADQUARTERS WASHINGTON DC//ASR-1//		
Alaskan	Federal Aviation Administration Spectrum Management Office, AAL-480 701 C Street, P.O. Box 14 Anchorage, AK 99513-0087 Phone: 907-271-5240	Alaska.
MSG ADD: FAA ALASKAN RGN ANCHORAGE AK//AAL-483/AAL-530//		
Central	Federal Aviation Administration Spectrum Management Office, ACE-474 601 12th Street Kansas City, MO 64106 Phone: 816-426-5647	Iowa, Kansas, Missouri, and Nebraska.
MSG ADD: FAA CENTRAL RGN KANSAS CITY MO//ACE-461/ACE-530//		
Eastern	Federal Aviation Administration Spectrum Management Office, AEW-483 Fitzgerald Federal Building JFK International Airport Jamaica, NY 11430 Phone: 718-712-6884	Delaware, D.C., Maryland, New Jersey, New York, Pennsylvania, Virginia, and West Virginia.
MSG ADD: FAA EASTERN RGN NY NY//AEA-483/AEA-530//		
Great Lakes	Federal Aviation Administration Spectrum Management Office, AGL-472 2300 E. Devon Ave. Des Plaines, IL 60018 Phone: 847-294-7332	Illinois, Indiana, Michigan, Minnesota, North Dakota, South Dakota, Ohio, and Wisconsin.
MSG ADD: FAA GREAT LAKES RGN DES PLAINES IL//AGL-483/AGL-530//		
Hawaiian	Federal Aviation Administration Spectrum Management Office, AWP-470H 4204 Diamond Head Road Honolulu, HI 96816-4420 Phone: 808-541-1241	Hawaii and US possessions in the Pacific Ocean.
MSG ADD: FAA HONOLULU TMSO FLD OFC HI HONOLULU HI//AWP-480H//		
New England	Federal Aviation Administration Spectrum Management Office, ANE-471 12 New England Executive Park Burlington, MA 01803 Phone: 617-238-7490	Connecticut, Maine, Vermont, Massachusetts, New Hampshire, and Rhode Island.
MSG ADD: FAA NEW ENGLAND RGN BURLINGTON MA//ANE-480/ANE-530//		

Northwest Mountain	Federal Aviation Administration Spectrum Management Office, ANM-472 1601 Lind Ave. SW Renton, WA 98055-4056 Phone: 206-227-2328	Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming.

MSG ADD: FAA NORTHWEST MTN RGN SEATTLE WA//ANM-464/ANM-530//

Southern	Federal Aviation Administration Spectrum Management Office, ASO-473 P.O. Box 20636 Atlanta, GA 30320 Phone: 404-305-6672	Alabama, Florida, Kentucky, Mississippi, North Carolina, Georgia, South Carolina, Tennessee, US possessions in the Caribbean, Virgin Islands.

MSG ADD: FAA SOUTHERN RGN ATLANTA GA//ASO-483/ASO-530//

Southwest	Federal Aviation Administration Spectrum Management Office, ASW-483 4400 Blue Mound Road Fort Worth, TX 76193-0465 Phone: 817-222-4762	Arkansas, New Mexico, Oklahoma, Texas, and Louisiana.

MSG ADD: FAA SOUTHWEST RGN FT WORTH TX//ASW-483/ASW-530//

Western Pacific	Federal Aviation Administration Spectrum Management Office, AWP-475 P.O. Box 92007 Worldway Postal Center Los Angeles, CA 90009-2007 Phone: 310-725-3475	Arizona, California, including off-shore islands, and Nevada.

MSG ADD: FAA WESTERN PACIFIC RGN LOS ANGELES CA//AWP-483/AWP-530//

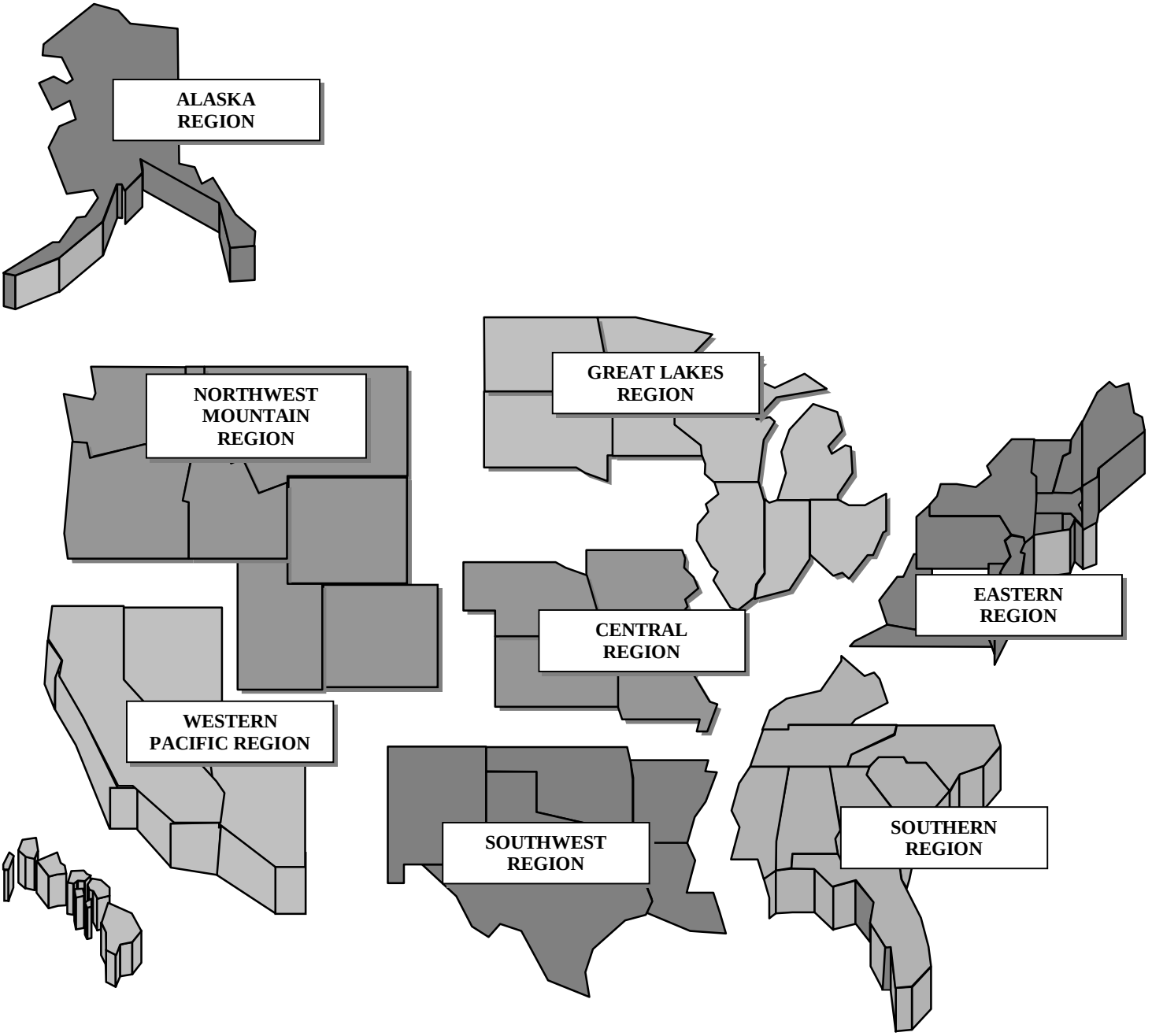

Figure I-1. FAA Region Map

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ENCLOSURE J

GEOGRAPHIC AREA OF COGNIZANCE/AGENCIES
DOD AREA FREQUENCY COORDINATORS

1. EA Geographic Area of Cognizance. EW is strictly controlled within geographic areas in accordance with Joint Staff directives governing test and exercise ranges. Clearance to operate in these areas must be granted by the appropriate Area Frequency Coordinator in addition to coordination requirements of Enclosure B.

2. DOD Geographic Area of Cognizance

Geographic Area	Controlling Agency
Alaska	Area Frequency Coordinator JFMO AK Elmendorf AFB, AK 99506-5001

MSG ADD: JFMO-AK ELMENDORF AFB AK
DSN: 317-552-2283

Arizona	Area Frequency Coordinator Ft Huachuca, AZ 85613-5000 Tel: 602-538-6423

MSG ADD: DOD AFC AZ FT HUACHUCA AZ//SFIS-FAC-SH//
DSN: 879-6423

Colorado, west of 108°W; New Mexico; Utah, East of 111°; and Texas, west of 104°W.	Area Frequency Coordinator White Sands Missile Range, NM 88002-5526 Tel: 505-678-5417

MSG ADD: DOD AFC WHITE SANDS MISSILE RANGE NM//SFIS-FAC-SS//
DSN: 258-3702

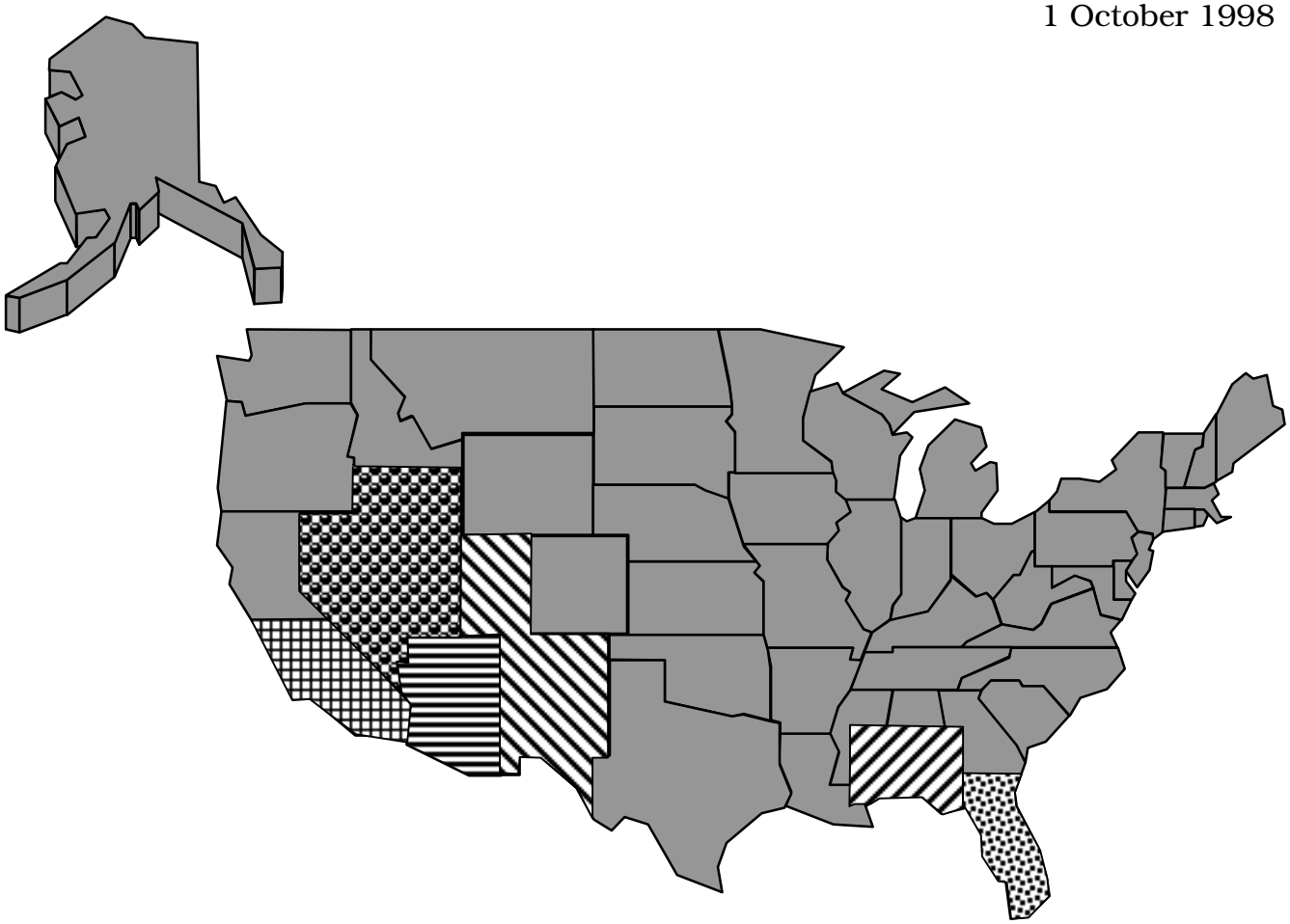
Florida, East of 83°W; and Georgia, East of 83°W and south of 31°30' N.	Eastern Area Frequency Coordinator Patrick AFB, FL 32925-6345 Tel: 407-494-5366

MSG ADD: DOD EAFC PATRICK AFB FL
DSN: 854-5837/5838 Commercial: 407-494-5837

Puerto Rico, 200 nm radius of AFWTF 18° 15'N, 65° 38'W of Puerto Rico	DOD Area Freq Coordinator Puerto Rico CODE 096 PSC 1008, Box 3023 FPO AA 34051-9000 Tel: 809-865-5227/7001

MSG ADD: DOD AFC PR ROOSEVELT ROADS PR
DSN: 831-5227

California, south of 37°30'N, including all off-shore islands MSG ADD: WAFC PT MUGU CA DSN: 351-7983/7981	Western Area Frequency Coordinator Point Mugu, CA 93041-5001 Tel: 805-989-7983
Alabama, south of 33°30'N; Florida, west of 83°W; Georgia, west of 83°W and south of 33°30'N; Louisiana, East of 90°W; and Mississippi, East of 90°W and south of 33°30'N. MSG ADD: DOD GAFC EGLIN AFB FL	Gulf Area Frequency Coordinator Eglin AFB, FL 32542-6346 Tel: 904-882-4416 DSN: 872-4416
Nevada; Utah, west of 111°W; and Idaho, south of 44°N. MSG ADD: DOD AFC NELLIS AFB NV DSN: 682-3417	DOD Area Frequency Coordinator Nellis AFB, NV 89191 Tel: 702-652-3417



DOD AFC WESTERN AREA (WAFC)

DOD AFC

DOD AFC FT HUACHUCA

DOD AFC WHITE SANDS MISSILE RANGE

DOD AFC GULF AREA EGLIN (GAFC)

DOD AFC EASTERN AREA (EAFC)

Figure J-1. Map of Geographic Areas

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ENCLOSURE K

NORAD EA COORDINATION ADDRESSES

NORAD Regions/Sectors	Message Address
ALASKAN NORAD Region	ANR ELMENDORF AFB AK//DO/DOC//
CANADIAN NORAD Region	1 CAD/CANR//DCR/A3//
CONUS NORAD Region	CONR TYNDALL AFB FL//DO/DOC//
Northeast Air Defense Sector	NORTHEAST AIR DEFENSE SECTOR ROME NY//DO/DOC//
Southeast Air Defense Sector	SOUTHEAST AIR DEFENSE SECTOR TYNDALL AFB FL//DO/DOC//
Western Air Defense Sector	WESTERN AIR DEFENSE SECTOR MCCHORD AFB WA//DO/DOC//

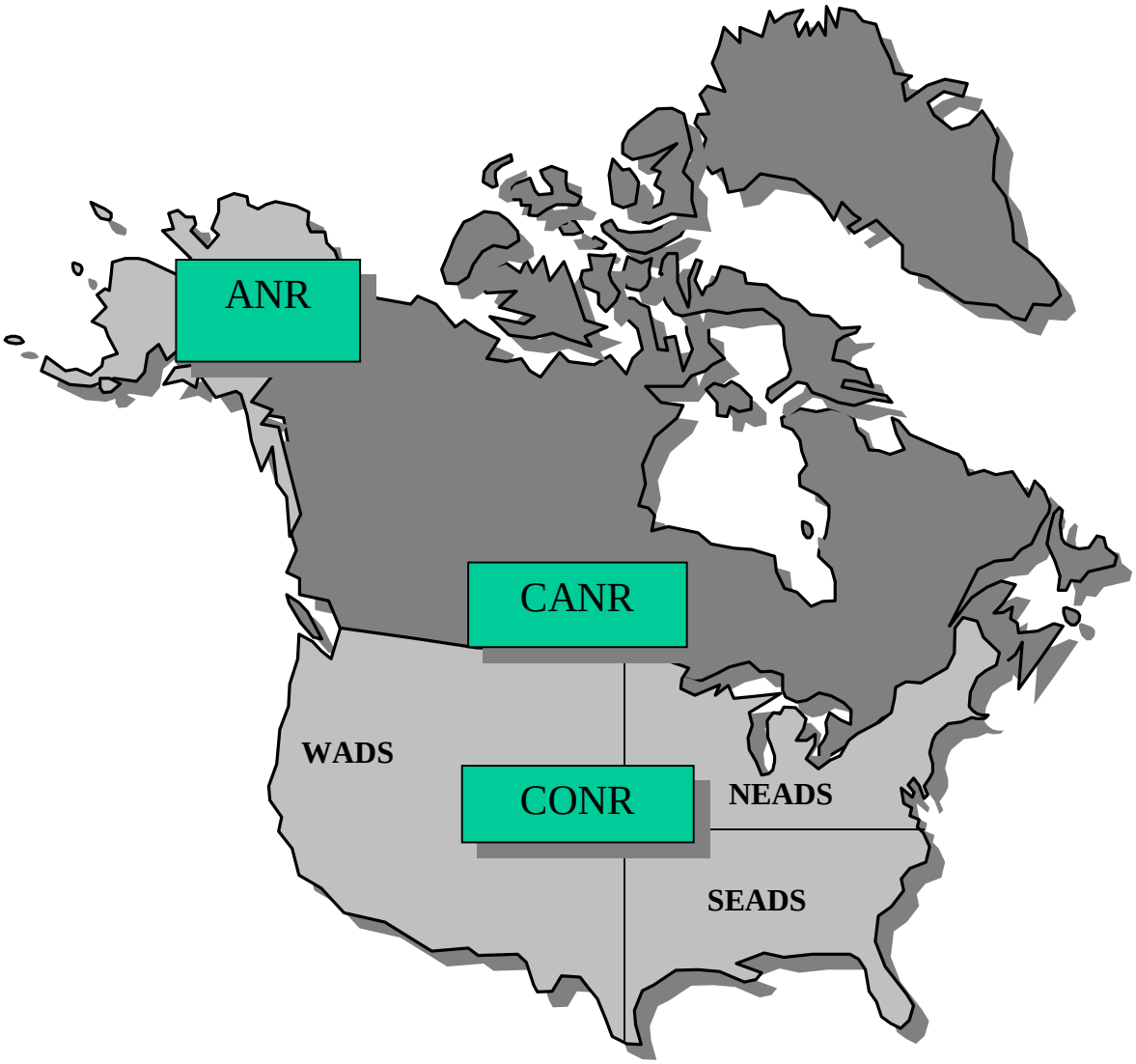

Figure K-1. Map of NORAD Regions and Sectors

ENCLOSURE L

DEFINITIONS[1]

1. Airborne EA. All types of electronic jamming, electronic deception, or the use of EA expendables including chaff, flares, unmanned vehicles, decoys, and unattended jammers dispensing done by aircraft or other vehicles during flight.

2. Authorized Tactical Only (Auth Tac) Frequency. Frequencies whose authorization is delegated for EW operations to the Services without further clearance action. NOTE: Enclosure E frequencies under Canada require Canadian clearance.

3. Barrage Jamming. Simultaneous electronic jamming done by aircraft or other airborne vehicles over a broad band of frequencies. (Joint Pub 1-02)

4. Big Photo. A general call sign used to contact aircraft performing airborne EA.

5. Burst. Chaff dropped with a separation (time interval) great enough to appear on a radar scope as individual target returns.

6. Buzzer. Electronic noise jamming or deception.

7. Canada. For purposes of this regulation, Canada includes the 10 Provinces, the Yukon and the Northwest Territories; the Arctic Islands and surrounding waters; the area extending to the outer boundaries of the Atlantic and Pacific Canadian Air Defense Identification Zone (ADIZ); and the Northern Domestic Airspace, or a perimeter 200 nm seaward from the coastal provinces and territories, whichever is further out, except where this infringes on territorial limits of other nations or states.

8. Cease Buzzer. Unclassified term to terminate EA activities including the use of EW expendables.

9. Chaff. Radar reflector which usually consists of thin, narrow metalized fiberglass strips of various lengths and frequency responses, used to reflect radar signals for confusion purposes. (Joint Pub 1-02)

10. Directed Energy. An umbrella term covering technologies that relate to the production of a beam of concentrated electromagnetic energy or atomic or subatomic particles. Also called DE. (Joint Pub 1-02)

[1] Used only in context with this manual unless otherwise denoted

11. Directed Energy Warfare. Military action involving the use of directed-energy weapons, devices, and countermeasures to either cause direct damage or destruction of enemy equipment, facilities, and personnel, or to determine, exploit, reduce, or prevent hostile use of the electromagnetic spectrum through damage, destruction, and disruption. It also includes actions taken to protect friendly equipment, facilities, and personnel and retain friendly use of the electromagnetic spectrum. Also called DEW. (Joint Pub 1-02).

12. Directed Energy Weapon. A system using directed energy primarily as a direct means to damage or destroy enemy equipment, facilities, and personnel. (Joint Pub 1-02)

13. Electronic Attack (EA). That division of electronic warfare involving the use of electromagnetic, directed energy or antiradiation weapons to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy combat capability. EA includes:

a. Actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum, such as jamming and electromagnetic deception.

b. Employment of weapons that use either electromagnetic or directed energy as their primary destructive mechanism (lasers, radio frequency, weapons, particle beams), or antiradiation weapons.

14. Electronic Attack Frequency Clearance. Authorization to conduct EW in a specific area on designated frequencies, and under specific conditions and parameters.

15. Electronic Attack Frequency Deconfliction. Actions taken to integrate those frequencies used by electronic attack systems into the overall frequency deconfliction process. (The term “deconfliction” and its definition is proposed for inclusion in the next edition of Joint Pub 1-02 by Joint Pub 3-51)

16. Electronic Attack Expendables. Nonrecoverable EA devices such as chaff, flares, unmanned vehicles, decoys, and unattended jammers. (CJCSI 2110.03)

17. Electronic Attack Planning Factors. Information required when submitting a formal clearance request. Factors address the environment (airspace and topography), parameters of the EA transmissions, timing, and scope of test or training.

18. Electronic Masking. The controlled radiation of electromagnetic energy on friendly frequencies in a manner to protect the emissions of friendly communications and electronic systems against enemy electronic attack support/signals intelligence (ES/SIGINT), without significantly degrading the operation of friendly systems. (Joint Pub 1-02)

19. Electromagnetic Deception. The deliberate radiation, reradiation, alteration, suppression, absorption, denial, enhancement, or reflection of electromagnetic energy in a manner intended to convey misleading information to an enemy or to enemy electromagnetic-dependent weapons, thereby degrading or neutralizing the enemy's combat capability. Among the types of electromagnetic deception are:

a. Manipulative Electromagnetic Deception. Actions to eliminate revealing, or convey misleading, electromagnetic telltale indicators that may be used by hostile forces.

b. Simulative Electromagnetic Deception. Actions to simulate friendly, notional, or actual capabilities to mislead hostile forces.

c. Imitative Electromagnetic Deception. The introduction of electromagnetic energy into enemy systems that imitate enemy emissions. (Joint Pub 1-02)

20. Electromagnetic Interference. Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. It can be induced intentionally, as in some forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, intermodulation products, and the like. Also called EMI. (Joint Pub 1-02)

21. Electromagnetic Intrusion. The intentional insertion of electromagnetic energy into transmission paths in any manner, with the objective of deceiving operators or of causing confusion. (Joint Pub 1-02)

22. Electromagnetic Jamming. The deliberate radiation, re-radiation, or reflection of electromagnetic energy for the purpose of preventing or reducing an enemy's effective use of the electromagnetic spectrum, and with the intent of degrading or neutralizing the enemy's combat capability. (Joint Pub 1-02)

23. Electronic Protection. That division of electronic warfare involving actions taken to protect personnel, facilities, and equipment from any

effects of friendly or enemy employment of electronic warfare that degrade, neutralize, or destroy friendly combat capability. Also called EP.

24. Electromagnetic Spectrum. The range of frequencies of electromagnetic radiation from zero to infinity. It is divided into 26 alphabetically designated bands. (Joint Pub 1-02)

25. Electronic Warfare. Any military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. Currently called EW, the three major subdivisions within electronic warfare are: electronic attack (EA), electronic protection (EP), and electronic warfare support (ES).

26. Electronic Warfare Support. That division of EW involving actions tasked by, or under direct control of, an operational commander to search for, intercept, identify, and locate sources of intentional and unintentional radiated electromagnetic energy for the purpose of immediate threat recognition. Thus, ES provides information required for immediate decisions involving EW operations and other tactical actions such as threat avoidance, targeting, and homing. Also called ES. Electronic warfare support data can be used to produce signals intelligence (SIGINT), both communications intelligence (COMINT) and electronics intelligence (ELINT). (Upon approval of Joint Pub 3-51, Revision 1, this term (ES) and its definition will modify the existing term and its definition and will be included in Joint Pub 1-02.)

27. Ground Photo. A general call sign for surface sites actively performing EA.

28. Harmful Interference. Interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service.[2] (NTIA Manual of Regulations and Procedures for Federal RF Management.)

29. Inflight EA Request. Inflight requests are no longer authorized. See Enclosure C paragraph 3, for inflight notification procedures.

30. Local (FAA or FCC) Frequency. Frequencies which require local FAA or FCC regional representative can authorize for use.

[2] NTIA Manual of Regulations and Procedures for Federal RF Management

31. Military Department (MILDEP) Frequency Management Office (FMO). Army Communications-Electronic Services Office; Naval Electromagnetic Spectrum Center; and Air Force Frequency Management Agency.

32. Military Frequency Coordinators. The DOD Area Frequency Coordinator (AFC), Army FMO CONUS, Naval AFC, and Air Force Major Command FMO.

33. National Frequency. Frequencies whose use require national (FAA, FCC, Department of State, and other agencies) coordination with Service FMO.

34. Restricted. ECM is authorized only when cleared by the cognizant military department, through the FAA and FCC annotated channels.

35. Rope Chaff. An element of chaff consisting of a long roll of metallic foil or wire, which is designed for broad, low-frequency response. (Joint Pub 1-02)

36. Routine EA Operations. Frequently recurring training or EA equipment checks using EW equipment with standardized times, and/or procedures in an approved area.

37. Special EA Operations. Tests and/or training, which are conducted on other than a frequent recurring basis and may require a planning conference or coordination of operating areas, times, and/or procedures.

38. Spot Jamming. The jamming of a specific channel or frequency. (Joint Pub 1-02)

39. Stream. Dispensing of chaff (solid/random interval/burst) at short intervals over an extended period of time and appearing on a radar scope as a continuous line of interference. (Joint Pub 1-02)

40. Surface EA. All types of electronic jamming, electronic deception, or chaff dispensing done by ground-based or shipboard equipment.

41. Sweep Jamming. A narrow band of jamming that is swept back and forth over a relatively wide operating band of frequencies. (Joint Pub 1-02)

42. United States. Includes the continental United States (CONUS) area, Alaskan area, Hawaiian area, Island of Guam area, and Puerto Rican Island area as explained below.

a. CONUS Area. The 48 states and the District of Columbia, plus the area extending to the outer boundaries of the coastal ADIZ or a perimeter 200 nm seaward from the coastal states, whichever is further out, except where this infringes on territorial limits of other nations.

b. Alaska Area. The land mass of Alaska, including the Aleutian Chain, plus the area extending to the outer boundaries of the Alaskan Coastal ADIZ.

c. Hawaii Area. The area within a 200 nm radius of 21°20'N, 157°57'W (Hickam AFB, Hawaii).

d. Guam Area. The area within a 200 nm radius of 33°40'N, 144°50'E (Andersen AFB, Guam).

e. Puerto Rico Operating Area. The area within a 200 nm radius of 18°15'N, 65°38'W (Atlantic Fleet WEAPON Training Facility, Roosevelt Roads, Puerto Rico). For NAVAL OPERATIONS: Commander Naval Forces Caribbean Instruction 3430.1 apply for EA operations in the Caribbean.

43. Unrestricted Frequency. Frequencies that may be used for EA operations and do not require a clearance request.

ENCLOSURE M

REFERENCES

1. AFR 55-44/AR 105-86/OPNAVINST 3430.9C/MCO 3430.1B, 6 December 1978, "Performing Electronic Countermeasures in the United States and Canada"

2. Communications Act of 1934

3. Federal Aviation Act of 1958

4. National Environmental Policy Act of 1969

5. International Telecommunications Union Radiocommunications Regulations

6. Federal Aviation Administration Handbooks 7610.4, 7610.11, 7610.4G and Range Regulation MSD 55-3

7. DODD 5200.1R, Security Classification Instructions

8. Joint Publication 1-02, DoD Dictionary of Military and Associated Terms

9. Joint Publication 3-51, Joint Doctrine for Electronic Warfare

10. Chairman Joint Chiefs of Staff Instruction 3212.03, Joint EW Policy

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GLOSSARY

ABBREVIATIONS/ACRONYMS

ABBREVIATION	PHRASE
ADIZ	Air Defense Identification Zone
AFC	area frequency coordinator
AFWTF	Atlantic Fleet Weapon Training Facility
AGL	above ground level
ARTCC	Air Route Traffic Control Center
ATC	air traffic control
BMW	Beamwidth
BW	Bandwidth
CINCNORAD	Commander in Chief, NORAD
CONUS	Continental United States
dB	decibel
DBm	Decibels per Milliwatt
DECSS 5	Director Electronics, Communications and Spectrum Services 5 (DECSS 5)
DOD AFC	Department of Defense Area Frequency Coordinator
DODD	Department of Defense Directive
DSN	digital switching network
ECM	electronic countermeasures
EA	electronic attack
EP	electronic protection
ES	electronic warfare support
EW	electronic warfare
	Federal Aviation Administration
FCC	Federal Communications Commission
FMO	Frequency Management Office
GHz	gigahertz
ICAO	International Civil Aviation Organization
IRAC	Interdepartment Radio Advisory Committee
ITU	International Telecommunications Union
JFMO	Joint Frequency Management Office

KHz	kilohertz
MHz	megahertz
MILDEP	military department
MOA	military operating area
MOP	memorandum of policy
MSL	mean sea level
NAVCAN	A private, non-profit agency responsible for the management and operation of the Canadian national air traffic control system. Transport Canada retains responsibility for policy, etc.
NDHQ	National Defence Headquarters (Canada)
NEPA	National Environmental Policy Act
NM	nautical miles
NORAD	North American Aerospace Defense Command
NTIA	National Telecommunications Information Agency
OPSEC	operations security
PWR	power
RF	radio frequency
SMO	Spectrum Management Officer
VFR	visual flight rules
VOR	very high frequency omnidirectional range